Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

SHOCK AND VIBRATION RATINGS — **LOW MICROPHONISM**
LIFE PERFORMANCE DATA — **RCA DARK HEATER**

"Command" Type for a Wide Variety of Applications Including: Mixers, Oscillators and Amplifiers up through the VHF Region; Multivibrators, Synchronizing Amplifiers and Industrial Control Circuits; and Mobile, Military, and Aircraft Equipment at Altitudes up to 80,000 Feet

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.350	amp
Peak heater-cathode voltage (Each unit):		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Grid to plate (Each unit)	1.1	pf
Grid to cathode and heater (Each unit)	2.2	pf
Plate to cathode and heater (Each unit)	1.0	pf
Plate to plate	0.1 max.	pf

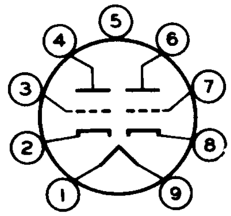
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	150	volts
Cathode Resistor	240	ohms
Amplification Factor	35	
Plate Resistance (Approx.)	6400	ohms
Transconductance	5500	μmhos
Plate Current	8.2	ma
Grid Voltage (Approx.) for plate μa = 10	-8	volts

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

Basing Designation for BOTTOM VIEW. 8CJ



Pin 1 - Heater
Pin 2 - Cathode of Unit No.2
Pin 3 - Grid of Unit No.2
Pin 4 - Plate of Unit No.2
Pin 5 - Internal Shield[b]
Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Positive-bias value	0	max.	volts
CATHODE CURRENT	18	max.	ma
GRID CURRENT	3	max.	ma
PLATE DISSIPATION	1.35	max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	165	max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance	0.5	max.	megohm

PUSH-PULL AMPLIFIER — Class AB_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

Same as for **AMPLIFIER — Class A_1**

Typical Operation:

Values are for Both Units

Plate Supply Voltage	300	volts
Cathode Resistor (Common to both units)	800	ohms
Peak AF Grid-to-Grid Voltage	19.8	volts
Zero-Signal Plate Current	9.8	ma
Max.-Signal Plate Current	12.6	ma
Effective Load Resistance (Plate-to-plate)	27000	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output (Approx.)	1	watt

Maximum Circuit Values:

Grid-Circuit Resistance	0.5	max.	megohm

[a] Without external shield.
[b] Pin 5 should be connected to ground.

CHARACTERISTICS RANGE VALUES

Values are For Each Unit and Are Initial Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current.	1	330	370	ma
Heater Current at 500 Hours . .	1	330	375	ma
Heater Current at 1000 Hours. .	1	330	380	ma
Direct Interelectrode Capacitances:				
Grid to plate	2	0.8	1.4	pf
Grid to cathode and heater. .	2	1.7	2.7	pf
Plate to cathode and heater .	2	0.7	1.3	pf
Plate to plate.	2	-	0.10	pf
Amplification Factor.	1,3	26	44	
Plate Current (1)	1,3	5.9	10.5	ma
Plate-Current Difference Between Units	1,3	-	1.8	ma
Plate Current (2)	1,4	-	45	μa
Plate Current (3)	1,11	5	-	μa
Transconductance:				
With heater volts = 6.3 . . .	3	4500	6500	μmhos
Change with heater volts = 5.7	3	-	15	%
Change at end of 500 hours with heater volts = 6.3 . .	3	-	20	%
Change at end of 1000 hours with heater volts = 6.3 . .	3	-	25	%
Change at end of 500 hours from heater volts = 6.3 to heater volts = 5.7 . . .	3	-	15	%
Transconductance Change:				
Difference between average transconductance initially and average transconductance after 500 hours expressed as a percentage of the initial average	1,3	-	15	%
Reverse Grid Current.	1,5	-	0.3	μa
Reverse Grid Current at end of 500 hours.	1,5	-	0.3	μa
Reverse Grid Current at end of 1000 hours	1,5	-	0.3	μa
Grid Emission Current	6,7	-	0.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,8	-	7	μa
Heater positive with respect to cathode.	1,8	-	7	μa
Heater-Cathode Leakage Current at end of 500 hours:				
Heater negative with respect to cathode.	1,8	-	7	μa
Heater positive with respect to cathode.	1,8	-	7	μa

	Note	Min.	Max.	
Heater-Cathode Leakage Current at end of 1000 Hours:				
Heater negative with respect to cathode.	1,8	–	7	μa
Heater positive with respect to cathode.	1,8	–	7	μa
Leakage Resistance:				
Between grid and all other electrodes tied together. .	1,9	100	–	megohms
Between plate and all other electrodes tied together. .	1,10	100	–	megohms
Leakage Resistance at the end of 500 hours:				
Between grid and all other electrodes tied together. .	1,9	50	–	megohms
Between plate and all other electrodes tied together. .	1,10	50	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With no external shield.

Note 3: With dc plate supply voltage of 150 volts, cathode resistor of 240 ohms, and cathode bypass capacitor of 1000 μf. Each unit is tested separately. Electrodes of units not under test are grounded.

Note 4: With dc plate voltage of 150 volts, plate load resistance of 0.25 megohm, and dc grid voltage of −10 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 5: With dc plate supply voltage of 150 volts, grid resistor of 0.5 megohm, cathode resistor of 240 ohms, and cathode bypass capacitor of 1000 μf. Each unit is tested separately. Electrodes of unit under test are grounded.

Note 6: With 7.5 volts ac or dc on heater.

Note 7: With dc plate voltage of 150 volts, grid resistor of 0.5 megohm, and dc grid voltage of −10 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 8: With 100 volts dc between heater and cathode.

Note 9: With grid 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

Note 11: With dc plate voltage of 150 volts and dc grid voltage of −4 volts.

SPECIAL TESTS & PERFORMANCE DATA

600-g Shock Test:

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 600 g. At the end of this test, tubes will not show permanent or temporary shorts, or open circuits, and are required to meet established limits for low frequency vibration, heater cathode leakage current, transconductance, and reverse grid current.

Fatigue Test:

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and are subjected to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours in each of three positions. At the end of this test,

tubes will not show permanent or temporary shorts, or open circuits, and are required to meet established limits for low frequency vibration, heater cathode leakage current, transconductance, and reverse grid current.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 tied to grid of unit No.2, ac heater volts = 6.3, plate supply volts = 150, dc grid volts = -3, plate load resistor (ohms) = 2000 and vibrational acceleration = 10 g at 40 cycles per second. The rms output voltage across the plate load resistor as a result of vibration of the tube must not exceed 130 millivolts.

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. Tubes will withstand a minimum of 2000 cycles of intermittent operation under the following conditions: ac heater voltage of 7.5 volts cycled one minute on, one minute off, with heater at a potential of +135 volts with respect to cathode, all other elements disconnected. At the end of this test, tubes will not show open heaters, open cathodes, heater-cathode shorts or excessive heater-cathode leakage.

Audio-Frequency Noise and Microphony Performance:

This test is performed on a sample lot of tubes from each production run, under the following conditions: Plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 to plate of unit No.2, ac heater volts = 6.3, cathode resistor (ohms) = 240, plate supply volts = 250, and plate load resistor (ohms) = 10,000. The output voltage must be less than 200 mv ac when the tube is tapped.

Shorts and Continuity Test (Thyratron-Type Detector Circuit):

This test, in addition to a 100% factory test, is performed on a sample lot of tubes from each production run. A tube is considered inoperative if either unit shows a permanent or temporary short or open circuit or a value of reverse grid current in excess of 1 microampere under the conditions specified in the *Characteristics Range Values* for reverse grid current.

Grid-Pulse Emission Test:

This test is performed on a sample lot of tubes from each production run, under the following conditions: ac heater volts = 6.3, plate volts = 150, grid driven 30 volts positive, from a cutoff bias of -30 volts dc, with a 10 microsecond pulse at a pulse repetition rate of 1000 pulses per second. Tubes must meet a minimum peak current value of 270 milliamperes.

AC Emission Test:

This test is performed on a sample lot of tubes from each production run under the following conditions: ac heater volts = 5.0, plate volts = 100, and grid volts (rms) = 5.0. Tubes must meet a limit dc plate current of 11 milliamperes.

2- and 20-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run, under the following conditions: ac heater volts = 6.3, plate supply volts = 150, cathode resistor each unit (ohms) = 240, grid resistor each unit (megohm) = 0.5, dc heater to cathode voltage of 135 volts (heater positive with respect to cathode), and room temperature. The value of transconductance measured at the end of two and twenty hours, must be within 10 per cent of the initial reading.

100-hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. The conditions are the same as for the two and twenty hour Stability Life Performance except that the heater is switched off once every two hours and the tube cools with electrode potentials applied. A tube is considered inoperative at the end of 100 hours total heater-on time if it shows a permanent short, open circuit, or a value of reverse grid current in excess of 1 microampere measured under the conditions specified in *Characteristics Range Values* for reverse grid current. Tube must also meet minimum gm limit.

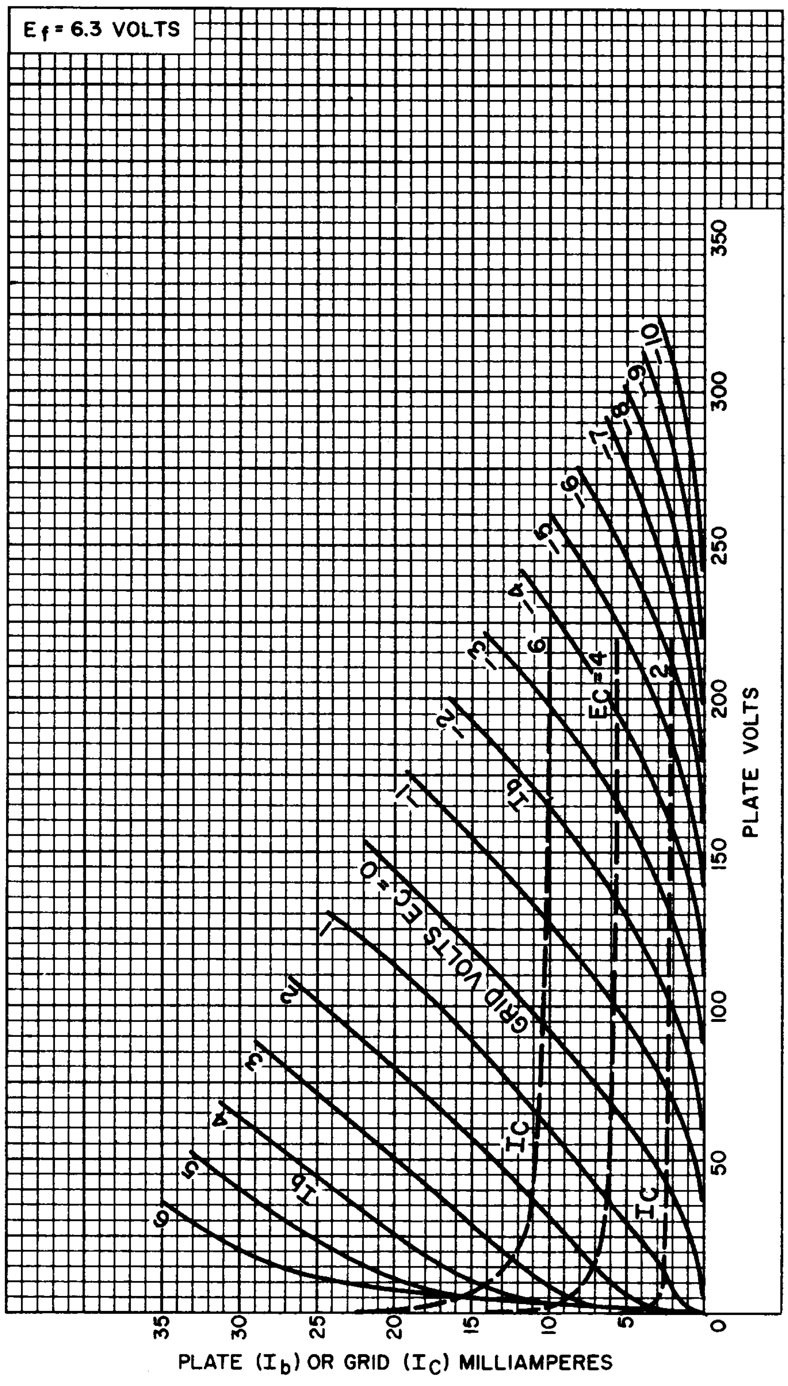
500-hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. The conditions for life test are as given above for the two and twenty hour Stability Life Performance Test except that the bulb temperature is maintained at 165° C. At the end of 500 hours total heater-on time tubes must not show any shorts or open circuits and must pass the established 500 hours limits of heater current, reverse grid current, heater cathode leakage current, transconductance changes and leakage resistance shown under *Characteristics Range Values*.

1000-hour Intermittent Life Performance:

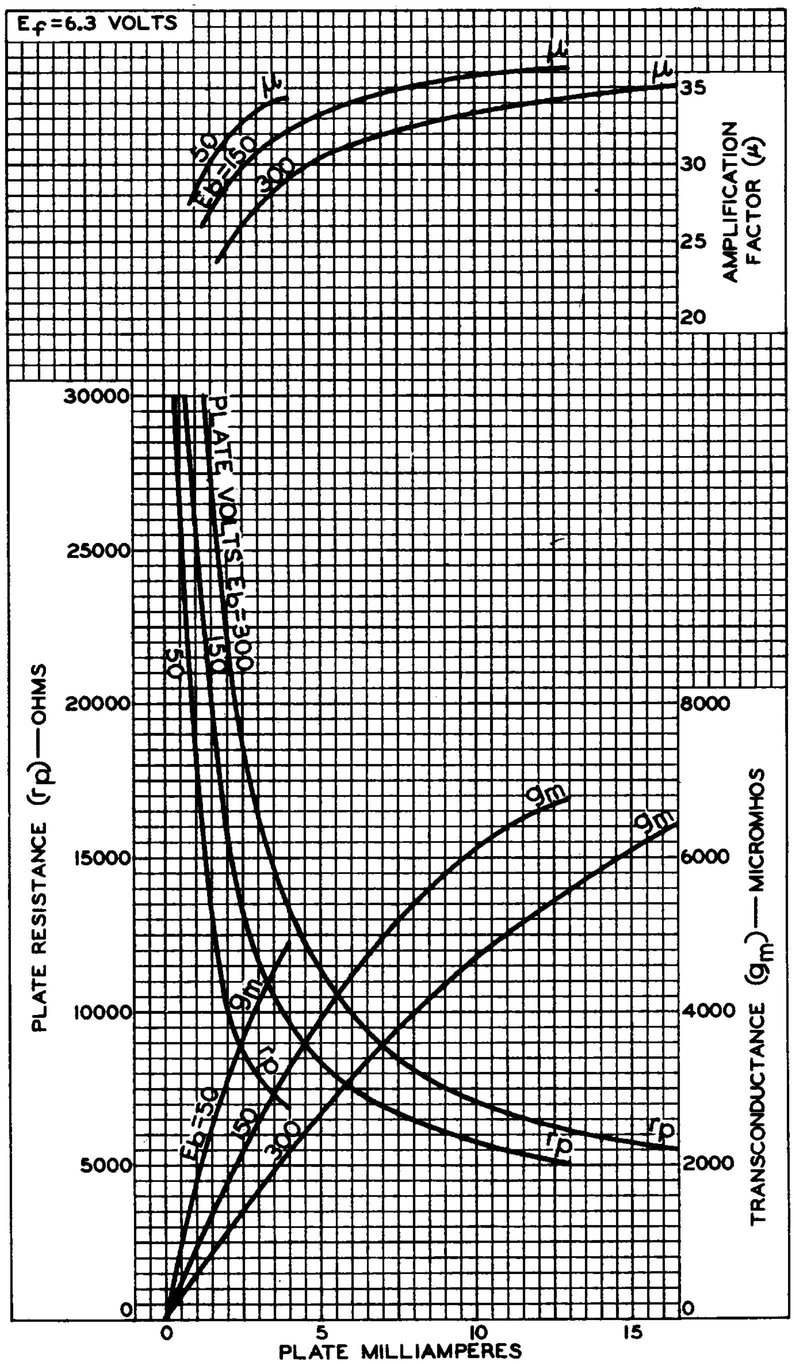
This test is performed on a minimum of one production run per month under the same condition as the 500 hour Intermittent Life Performance. At the end of 1000 hours total heater-on time, tubes must not show permanent or temporary shorts or open circuits and must pass the established 1000-hour limits for heater current, transconductance change, reverse grid current and heater cathode leakage current shown under the *Characteristics Range Values*.

AVERAGE PLATE CHARACTERISTICS
Each Unit



92CM-12087

AVERAGE CHARACTERISTICS



92CM-12088